

Cumulative Impact Analysis for Water Quantity

Water Policy Interim Committee
60th Montana Legislature
Thompson Falls, Montana
09/12/07

Marc M. Spratt, CGWP, PH, CPG
RLK Hydro, Inc.
Kalispell, Montana

The Clark Fork Basin

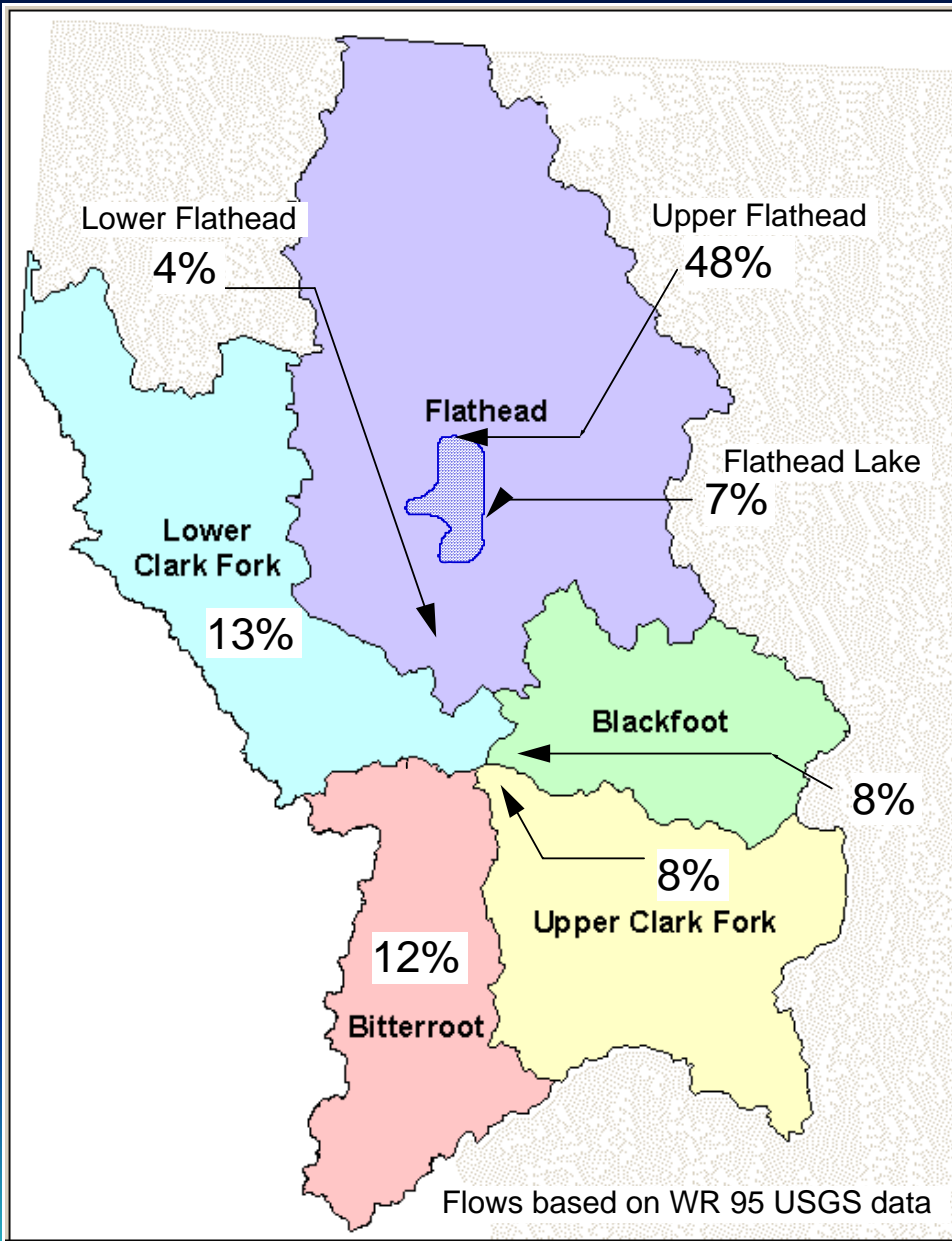
Widely varying conditions
climate, soils, geology

Widely variable water availability

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

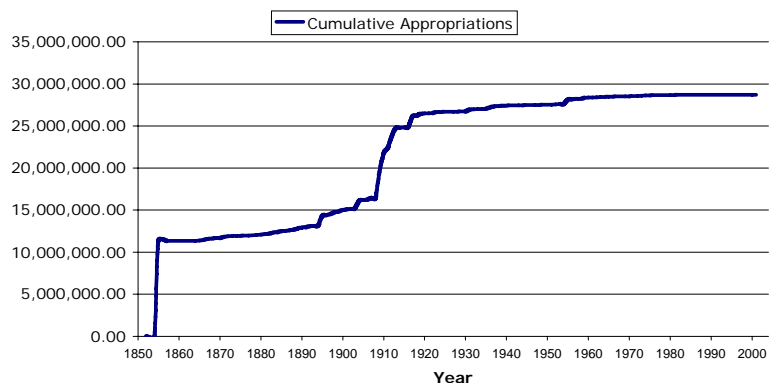
Clark Fork Basin Flow Distribution

Drainage area - 21,833 sq. mi.
(13,973,120 acres)
Average discharge - 20,504 cfs
14,818,240 ac-ft.

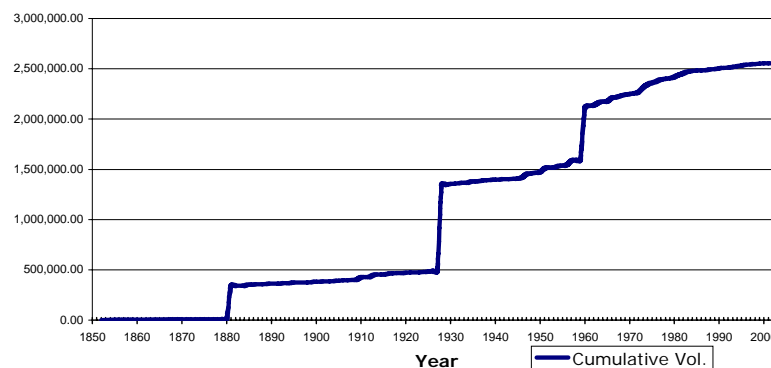


Cumulative Impacts ?

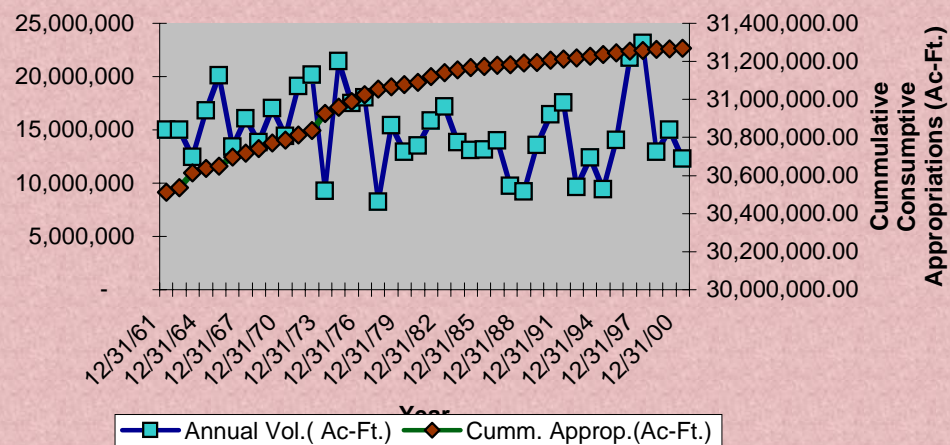
Cumulative Surface Water Consumptive Use Appropriations In Clark Fork Basin 1852 - 2001



Cumulative Consumptive Groundwater Appropriations in Clark Fork Basin 1852 - 2002

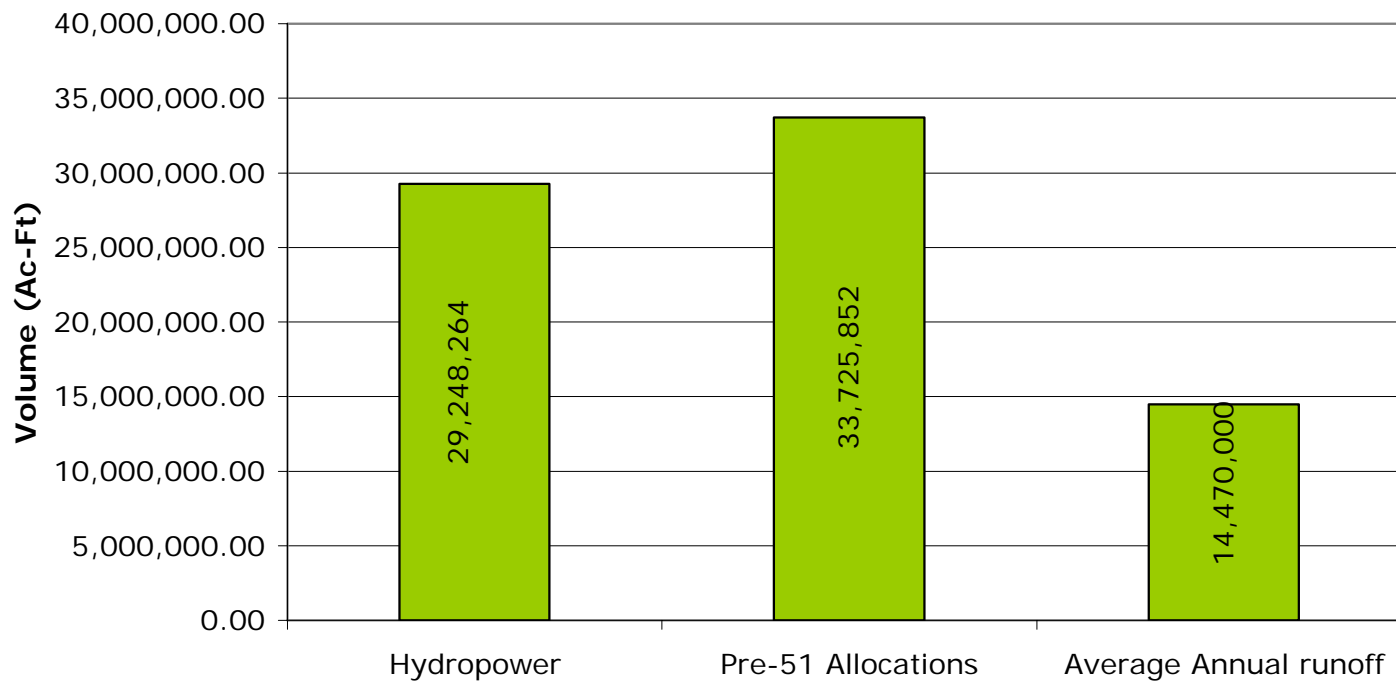


Annual Clark Fork Basin Discharge and Cumulative Consumptive Appropriations



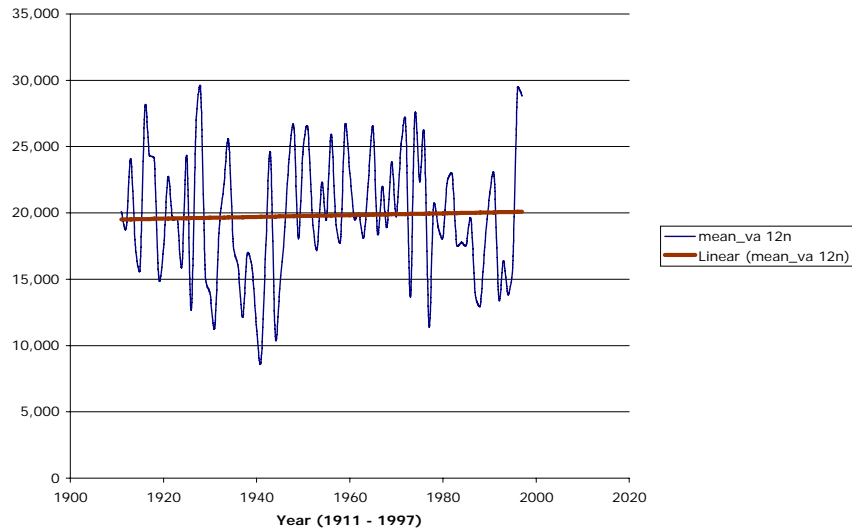
Allocations & Discharge

Clark Fork River Basin Appropriations Pre-1951 & Annual Discharge

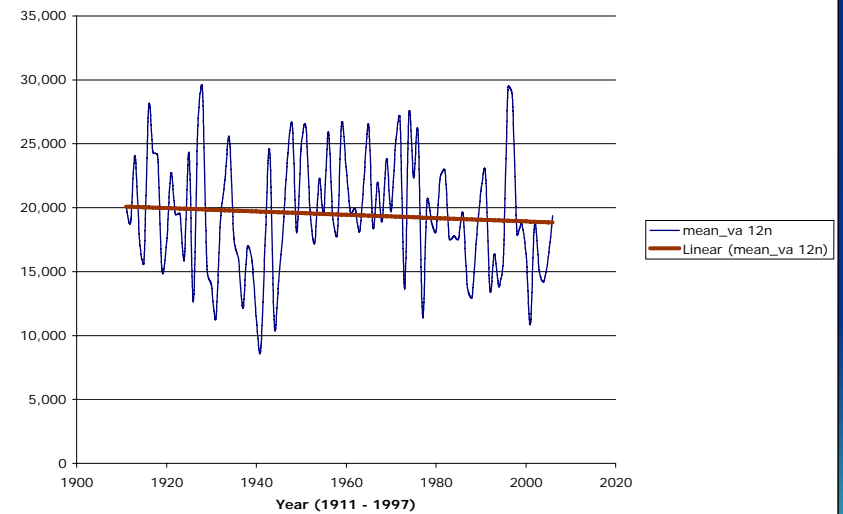


Climate & Discharge

Mean Annual Flow @ Plains based on WY
record minus the drought 97 - 2005



Mean Annual Flow @ Plains based on WY
record plus the drought 97 - 2005



Physical Evidence

54% of the Annual Discharge at Noxon is from the Flathead Basin
20,504 cfs or 14,818,240 ac-ft/year.

Consumptive Use appropriations increase every year since 1852.

The Cumulative consumptive use appropriations are greater than
31,200,000 ac-ft/yr or more than 2 times the average annual discharge.

No decrease, or depletion, is evident in the long-term flow records at Plains.



Issues

WATER RIGHTS IN THE CLARK FORK BASIN

TU vs. DNRC - groundwater connected to surface water.

Thompson River Lumber Company Administrative Hearing Decision

Water is only available for appropriation 16 - 22 days per year

A call is not futile because the water not reaching the
objector is too small to measure (.000057 or 0.006% of low flow)

Therefore measurable is not a standard but rather calculable and
all water is connected.

Calculable vs. Measurable

From 85-2-102 - “Substantial credible information” means probable, believable facts sufficient to support a reasonable legal theory ...

The term “probable” could be interpreted to imply a scientific basis of the facts.

Calculations involve the basic actions of addition, subtraction, multiplication and division and in this instance are based upon measured flows and volumes.

According to Moore (1962) with respect to multiplication and division, the number of significant digits retained in the final result of the calculation is the least number of significant digits in any of the component measurements.

The USGS reports flows at Plains to the nearest whole cfs, no decimal points. Therefore any calculation using USGS data from Plains should be limited to at least whole cfs.

Final Comments

Cumulative impact assessments ? All new appropriations require an assessment. Scope is an issue. Main stem flows have not been significantly impacted by appropriations, identified impacts are limited to lower order streams. In the Flathead, impacts are generally limited to less than 4th order streams.

With the exception of an exempt well and very large appropriations, size (flow rate and volume) makes no difference in the assessment requirement.

A cumulative impact assessment depends on measurements and use of existing data and new data. A definition of calculable that is based upon measurable values is mandatory to establish a defensible allocation system.

Can an impact assessment be performed if the actual pumping volume and rate, consumptive use, and rate and timing of the return flow of existing water right holders are unknown?